



Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at <http://about.jstor.org/participate-jstor/individuals/early-journal-content>.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.

SCIENTIFIC RESULTS OF THE SECOND THULE EXPEDITION TO NORTHERN GREENLAND, 1916-1918*

I

MIGRATION ROUTES OF THE ESKIMOS IN NORTHERN GREENLAND

By KNUD RASMUSSEN

ESKIMO HOUSE RUINS

The Second Thule Expedition had as one of its main objects the search for traces of earlier Eskimo migration. We found on our way from Etah to Humboldt Glacier an amazingly large number of ruins of earlier Eskimo buildings. Not less than nine settlements south and one north of Humboldt Glacier were determined, with a total of 60 houses. Wherever possible the ruins were measured. Regular excavation could not be undertaken on account of the extreme cold, as we passed the ruins at the beginning of April. Everything was covered with deep snow. Doubtless an examination undertaken in July or August would bring good results and give an opportunity to find more houses. I have been informed by Eskimo bear-hunters that settlements could be found far up Advance Bay, into which the expedition was not able to go, as it would have led too far away from the main route.

All measurements of house ruins proved them to have been extraordinarily small, evidently because of lack of building material. In order to build a real Eskimo house of stone, the material always used, one needs large, solid, and, if possible, flat stones. But as the rocks here consist of sandstone, only to be found in scattered pieces, it was impossible to build larger houses, even if the hunting conditions would have allowed such extravagance. This assumption is proved to be right by the fact that the houses near Rensselaer Bay and Marshall Bay were larger than all the others, because here were found gneiss and granite rock, while the hunting conditions were not better than where we found only small houses. In addition there were some peculiar fox traps, which were built in the manner of a cairn, sometimes 170 centimeters high, called *uvdlisatit*; these are no longer in use but are well known to the Eskimos. The name expresses the fact that one does not need to look after them every day.

The foxes were caught in the following manner: A decayed seal is placed at the bottom of a hollow stone cairn, while the entrance is covered

* The second of two articles presenting the results of the Second Thule Expedition, translated and condensed from the report published in the *Geografisk Tidsskrift*, Vol. 24, 1917-18, pp. 215-232. The first article, containing the narrative of the expedition by Knud Rasmussen, with map, appeared in the August Review.—EDIT. NOTE.

with willow twigs that are smeared with blood. The trap is built in a manner that makes it impossible for the fox to escape after he has jumped into it; and in this way several foxes can be caught in a few days.

The houses north of Humboldt Glacier were found in Benton Bay, about 12 kilometers distant from Cape Clay. In addition numerous tent rings and very large meat caches were discovered. The houses were built on gravel and small stones. The material was exclusively of stones, which were long and flat and sometimes rather large. In only one house we found that whalebones were also used. Several houses had remarkable forms; one of them was almost square, evidently on account of unfavorable material, poor rock, and lack of turf for pointing. The meat caches had the same forms and sizes as those we had measured and sketched on Blochs Island in Melville Bay.

The living conditions seem to have been splendid in this region. Many seals were observed, especially in the spring and the fall, and the ice around Humboldt Glacier gives good opportunity for bear-hunting. These house ruins in Benton Bay were the most northerly that were found by the expedition on the coast of Greenland. A thorough examination of the coast and the ice-covered land, with the assistance of our four Greenlanders, failed to produce any signs of an earlier building.

IMPROBABILITY OF ESKIMO MIGRATION AROUND NORTHERN GREENLAND

Even in the large fiords, especially Sherard Osborn Fiord and Victoria Inlet, where we were convinced we should find house ruins, not one was discovered, in spite of the fact that our hunting trips, both going and coming, brought us to all accessible places in the region. It is my confirmed opinion, as a result of my experience on this expedition, that there has never been any migration of the Eskimos around the north of Greenland. My reasons for this are briefly:

(1) On the entire northern coast no tent rings, fire places, or other marks of Eskimos are to be found. All places that necessarily would have had to be used for hunting during a migration were thoroughly examined. The people on a migration with their women and children would not have gone deliberately into difficult regions. Pack ice from Polaris Promontory to Sherard Osborn Fiord would have offered a considerable obstacle to the transport of families and household furnishings.

(2) The Eskimo migrations were not due to nomadic instinct but mostly—when enemy neighbors were not the compelling reason—to the desire to reach more favorable hunting grounds. The peculiar ice and snow conditions on the northern coast of Greenland make hunting on the sea impossible, and the ice-free coast areas are not large enough to furnish sufficient game to stationary or wandering tribes.

(3) Besides this, the distances here are very great. From the tent rings near Hall's grave—the most northerly known tent rings on the western coast of Greenland ($81\frac{2}{3}^{\circ}$)—to the tent rings near Independence Fiord—the most northerly known on the eastern coast—the distance which would have had to be covered by an Eskimo family is not less than 1,000 kilometers.

Taking up the last point in greater detail: From the houses in Benton Bay (80°), the most northerly known on the western coast of Greenland, to the houses near Mallemuk Rock on the eastern coast ($80\frac{1}{3}^{\circ}$), the distance to be covered by sledge is not less than 1,500 kilometers, about the same as between Upernivik and Julianehaab. An Eskimo family, to cover this distance with its necessary paraphernalia and primitive hunting apparatus, would be forced to make stops at places where there were good hunting opportunities. The distances that are covered in a year, or, rather during the spring, are without doubt very short. Besides, it is necessary for the wandering family to have the impression that the hunting conditions will improve from day to day.

Our expedition, which consisted of picked men equipped with the best weapons, had great difficulty in returning from these game-poor regions under the most favorable conditions of the season. I cannot believe that the climatological conditions and therewith the hunting conditions were different at the time the Eskimos undertook their migrations. The large fiords, St. George Fiord, Victoria Inlet, Sherard Osborn Fiord, Norden-skiöld Inlet, and all the other larger or smaller inlets as far as De Long Fiord, were filled with flowing inland ice, and nowhere on land were the conditions favorable for the existence of animals that would have permitted a family to stop for the winter.

The Eskimo members of our expedition were very unfavorably impressed by the bad conditions for seal-hunting and the poor material for building purposes, as the whole coast consists of loose shaly sandstones. They, like myself, were convinced that no Eskimo family would have dared to settle down on this coast.

In my estimation the natural conditions in the most northerly part of Greenland make an Eskimo migration from the western coast to the eastern coast by this route impossible. Granted that the climatological conditions and therewith the conditions for hunting were better at the time the Eskimos migrated—contrary to my belief—I do not think it possible that such migration could have left such slight traces as not to be discovered by the thorough examination of all the regions in every direction by our expedition.

Hitherto it has been believed that the Eskimos crossed over to Independence Fiord on the inland ice back of Peary Land proper. This would be impossible, as the existing conditions do not allow an ascent from the head of any of the fiords up to the inland ice. No Eskimo will undertake

a journey of 200 kilometers on the inland ice with wife and children, without knowing the natural conditions of the ground to be covered. A migration from northwestern to northeastern Greenland was impossible.

My belief is that several excursions were made to the north or east either from the winter houses near Lake Hazen on Grant Land or from Cape Benton; the tent rings near Polaris Promontory originate from such excursions. The unfavorable ice and hunting conditions were soon discovered, the route was given up, and the people went to Melville Bay, which is more thickly settled and has the most nearly ideal hunting conditions of all Greenland. From here they have scattered southward over all Greenland to Cape Farewell and from there followed the eastern coast. From the large settlement in the Angmagsalik district came the other Greenlanders all the way up to Mallemuk Rock, and from excursions and reconnoitering trips of these Greenlanders originate the tent rings found in Independence Fiord. At a later date I shall explain my opinions in detail and I will say only this in concluding my sketch:

One should be cautioned not to attach too much importance to the fact that musk oxen in small herds have migrated to the eastern coast around the north of Greenland. One is not warranted in deducing from this fact alone the conclusion that the Eskimos were able to procure food by which they could skirt northern Greenland and migrate down along the eastern coast.

II

BIOLOGICAL OBSERVATIONS:

PRELIMINARY ACCOUNT OF DR. WULFF'S RESULTS

By C. H. OSTENFELD and MORTON P. PORSILD*

Dr. Thorild Wulff's diaries and the collections we brought home show how much science has lost through his death; up to his last breath he made observations and sketches of the plant and animal life.

The last record in his diary says what another cannot express; he wrote (in Swedish):

Straining march until August 29 . . . 12,30 A.M. without finding food. I am half dead, but found a little *Woodsia* fern. I lay down 7 P.M.; will not be a hindrance to my comrades' rescue. . . .

Every page of his diaries proves the energetic spirit in which Wulff worked to procure valuable results for the expedition. Science owes this man much; and Sweden, his fatherland, and Denmark, to which he offered his last work, can be proud of what he did during a daily fight against death, that lasted almost three months.

* Dr. Porsild, Director of the Danish Arctic Station on the island of Disko, has looked over the diaries of Dr. Wulff and has written an account which I have used in connection with my own impressions, after looking through our collections, for a summary of the biological results.—C. H. O.

DR. WULFF'S BOTANICAL OBSERVATIONS

The value of Wulff's collections can only be judged after closer examination; but, inasmuch as very little is known of the zoölogical and botanical life of these regions, these observations must be of great scientific interest. Already the preliminary examination of the dried flowering plants has established the existence of several interesting and geographically important species, as *Minuartia (Alsine) Rossii* and *Erigeron uniflorus*, which were found on the northern coast of Greenland.

It may be said that Wulff's botanical collections complete the floral examination of Greenland. Plant geographical variations will naturally be added in the future but will not increase the known flora of Greenland considerably, since almost the whole coast has now been visited by botanists. In regard to the lower-class plants and animals our knowledge is much less, and therefore Wulff's collections will produce new views, especially concerning geographical distribution. In addition to this, it must be mentioned that the geologist of the expedition, Lauge Koch, partly assisted by Peter Freuchen and the American explorer Ekblaw, made a quite complete collection of flowering plants from the environs of Thule (Wolstenholme Sound) in 1916 that will be valuable to plant geography.

At the beginning of June Wulff visited the coast of Markham Island (east of Elison Island, 83°), with its relatively rich vegetation, but had to return after some time for lack of game. Here at Markham Island, at the most northerly point he reached, which was near Low Point, he built a cairn in which he placed an account for the leader of the expedition, and on June 13 he planted the yellow-blue flag of his country on the top of the cairn, proud of the fact that he had brought it farther north than it had ever been brought before.

The biological results comprise: (1) Dr. Wulff's well-kept diaries and (2) the collections.

THE DIARIES

The diaries contain, besides an account of the route of the expedition, notes on weather conditions, photographs, etc., also physiologic-psychologic reflections on the deteriorating effect upon himself of fatigue and hunger.

ZOÖLOGY

The zoölogical descriptions contain observations of the animals that were encountered by the expedition, especially of mammals and birds, and also fishes and animals of a lower order. Wulff was very desirous of finding out the conditions of life of the animals. He observed their methods of procuring food, the contents of their stomach, their propagation, and other biological matters, and tried to establish the temperature of the blood of some Polar animals.

BOTANY

Wulff's main botanical work was performed on the northern coast of Hall Land and farther north. He had to collect his material under quiescent winter conditions and was able only partly to identify the material on the spot. Therefore his diaries do not give an exact account of all he found. It seems that, in the very short time he worked, he had collected all higher-class plants that could be thought to exist there and several rare extreme arctic types, whose existence he established. Sixty-six species of higher-class plants are discussed in the diaries, and the working out of his collections will doubtless produce a greater number. Hitherto only 29 species were known from Humboldt Glacier northward. The diaries contain many observations on botanical conditions in extreme temperatures and on the biology of nutrition and reproduction.

Wulff made serial measurements of the temperature of and near the vegetating plants. It is of special interest that he was able to establish a total absence of higher plant life on the large 780 meter-high land inside of the inland ice belt which the expedition crossed on the return. Only a few species of moss and lichens were found; these did not grow on the calcareous ground but only on loose blocks of gneiss and diabase. Animal life even of a lower order could not be detected. So far no land in the northern hemisphere has been found to be so bare of life, and its like is only known on the Antarctic Continent. Wulff's observations will therefore be of the greatest interest in relation to the fate of the Greenland flora during the Ice Age.

After descending from the inland ice, Wulff found that the vegetation at the easterly end of Inglefield Land was far richer in species and in much better condition for examination. This part of Inglefield Land has hitherto been unknown botanically, while the more easily accessible western side has been well examined and shows a flora of 82 species.

THE COLLECTIONS

The collections comprise:

(a) A rich and beautifully prepared collection of flowering plants, mosses, and lichens, some species of algae and parasitic fungus and sponges.

(b) Several prepared birds, birds' eggs, some marine animals, many insects, and no small number of intestinal parasites of higher-class animals.

(c) Specimens of the soil and the contents of stomachs, taken for bacteriological examination.

(d) Specimens of sea water and plankton, collected to the depth of 400 meters on the voyage up from Disko to Thule in the fall of 1916. Examination of the water and the plankton will surely be of great interest, as the sea north of Disko has been little known from this standpoint.

III

GEOGRAPHICAL POSITIONS

By LAUGE KOCH

In regard to the cartographical results I refer to the geological map,¹ on which all geographical corrections and new discoveries are indicated. Only a few latitudes were calculated, and the larger part of the material has not yet been worked out. From the northern coast we obtained about 40 observations of latitude, about 80 determinations of azimuth, and about 40 determinations of longitude. The time was kept from Etah and return, during the whole voyage, without mishap. About 120 sketches and sights of land for cartographical and geological use were brought back. About 150 altitudes were determined trigonometrically.

IV

SUMMARY OF GEOLOGICAL RESULTS²

By LAUGE KOCH

STRATIGRAPHY

On the way up through Smith Sound and Robeson Channel one passes from south to north Archean, Algonkian, Cambrian, Silurian, and probably Devonian formations. A closer view shows that the strata extend across northern Greenland, forming belts in which one layer follows the other and the most recent are to be found farthest north. Archean formations are found in Melville Bay and toward the northeast. Algonkian strata are established in the region of Wolstenholme Sound-Inglefield Bay, south of St. George Fiord, and in the region Danmark Fiord-Independence Fiord. The strata consist of sandstone and limestone with ripple marks and diagonal structures. Some places show strong diabase eruptions. I found Cambrian slates near Cape Constitution ($80\frac{1}{2}^{\circ}$). The fauna contains the same species as are found in northern Europe and New Brunswick. Silurian limestone exclusively from the lowest and middle Gotlandian is found in Washington Land, Hall Land, and towards Peary Land. Pentamerus lime and Rastrites slate (Clinton) underlie the limestone and Monograptus slate (Niagaran). The fauna resembles that of northern Europe, northern Asia, and northern North America. Green slates overlie the Silurian series. On the northern coast of Greenland these are folded into a mountain chain, which forms, with the Victoria and Albert Mountains of

¹ Its topographical outlines are reproduced on the map accompanying the first article, in the August number, p. 118.—EDIT. NOTE.

² A translation of the geological results, as given *in extenso* in the Danish original, is to appear, it is understood, in the *Journal of Geology*.—EDIT. NOTE.

Grinnell Land, a folded chain about 1,000 kilometers in length. The mountains are residual in character, and the folding that gave rise to later elevation probably originates from the second half of the Paleozoic Era. These layers prove a Paleozoic transgression, the largest known in Greenland. Its development is mainly the same as it is in Arctic North America.

POSTGLACIAL FORMATIONS

Up to the present no postglacial formations were found in Melville Bay. Postglacial formations in the Cape York district and on Washington Land are poorly developed. Deltas are found at the valley mouths; the highest of these reaches 160 meters. In many places old Eskimo houses fall into the sea, which may prove that the subsidence in Danish Greenland also takes place in the Cape York district. Alluvium is relatively widespread on the northern coast of Greenland. A lowering of 50 meters would submerge 2,000 square kilometers that are covered by marine layers. Marine formations with shells go up to a height of 135 meters. Strand lines are found up to a height of 210 meters. The northern coast was not more ice-covered when it was 100 meters lower than it is at present.

GLACIOLOGY

The belt of rocks and islands that gird the coast between Holms Island and Cape York are covered by low inland ice that leaves only the outer islands free. The inland ice in the Cape York district is apparently only in slow movement. Ice cracks are rare, a fact that is very important from the standpoint of communication between settlements. In a few places a strong advance movement has recently taken place in the glacier ice. The Humboldt Glacier can be considered as the edge of the inland ice, occupying a plain the edge of which is overflowed by the sea. Ice cracks are not to be found.

In Sherard Osborn Fiord, Victoria Inlet, Nordenskiöld Inlet, and in one arm of De Long Fiord flowing inland ice was observed. Southwest of St. George Fiord are large ice-free regions, while the regions toward Peary Land are thickly covered with ice. The northwesterly parts of Peary Land are ice-free, with the exception of a few local glaciers. These show signs of having had the same extent for a long period; there were found no proofs that they have either enlarged or decreased in size.